

(b) a cell culture comprising one or more electrically active cells having a cell membrane including one or more ion channels, which one or more cells are capable of providing a measurable action potential that exhibits one or more perceptible characteristics in response to a test substance; and

(c) an intervening layer in contact with the microelectrode surface, which (i) comprises a surface modifying agent, and (ii) is positioned between said microelectrode and the one or more cells of said cell culture, that provides a high impedance seal with said one or more cells of said cell culture,

and in which said accompanying software comprises instructions that can be implemented by a computer and which are capable of relating changes in the one or more characteristics exhibited by said action potential to one or more ion channels of said one or more cells upon exposure of said one or more cells to a test substance.

15. (Twice Amended) A system capable of identifying one or more ion channels of a cell, which elements are affected by a test substance, comprising a device and accompanying software,

in which said device comprises:

- (a) a solid state microelectrode;
- (b) a cell culture comprising one or more electrically active cells having a cell membrane including one or more ion channels, which one or more cells are capable of providing a measurable action potential that exhibits one or more perceptible characteristics in response to a test substance; and

(c) an intervening layer in contact with the microelectrode surface which (i) comprises a surface modifying agent, and (ii) is positioned between said microelectrode and the one or more cells of said cell culture, that provides a high impedance seal with said one or more cells of said cell culture, said intervening layer further comprising cell anchorage molecules;

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and in which said accompanying software comprises instructions that can be implemented by a computer and which are capable of relating changes in the one or more characteristics exhibited by said action potential to one or more ion channels of said one or more cells upon exposure of said one or more cells to a test substance.

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17. (Twice Amended) A system capable of identifying one or more ion channels of a cell, which elements are affected by a test substance, comprising a device and accompanying software,

in which said device comprises:

(a) a solid state microelectrode;

(b) a cell culture comprising one or more electrically active cells having a cell membrane including one or more ion channels, which one or more cells are capable of providing a measurable action potential that exhibits one or more perceptible characteristics in response to a test substance; and

(c) an intervening layer in contact with the microelectrode surface which (i) comprises a surface modifying agent, and (ii) is positioned between said microelectrode and the one or more cells of said cell culture, that provides a high impedance seal with said one or more cells of said cell culture, said intervening layer further comprising a high viscosity mixture comprising alcohols, ethers, esters, ketones, amides, glycols, amino acids, saccharides,

carboxymethylsaccharides, carboxyethylsaccharides, aminosaccharides, acylaminosaccharides, polymers thereof, or combinations thereof;

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and in which said accompanying software comprises instructions that can be implemented by a computer and which are capable of relating changes in the one or more characteristics exhibited by said action potential to one or more ion channels of said one or more cells upon exposure of said one or more cells to a test substance.

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20. (Twice Amended) A system capable of identifying one or more ion channels of a cell, which elements are affected by a test substance, comprising a device and accompanying software,

in which said device comprises:

- (a) a solid state microelectrode;
- (b) a cell culture coated with a polymer comprising one or more electrically active cells having a cell membrane including one or more ion channels, which one or more cells are capable of providing a measurable action potential that exhibits one or more perceptible characteristics in response to a test substance; and
- (c) an intervening layer attached to the microelectrode surface which (i) comprises a surface modifying agent, and (ii) is positioned between said microelectrode and the one or more cells of said cell culture, that provides a high impedance seal with said one or more cells of said cell culture;

and in which said accompanying software comprises instructions that can be implemented by a computer and which are capable of relating changes in the one or more

characteristics exhibited by said action potential to one or more ion channels of said one or more cells upon exposure of said one or more cells to a test substance.

22. (Three Times Amended) The system of claim 1, wherein a second type of modified surface layer is in contact with the microelectrode surface that separates the one or more electrically active cells and is attractive to cell adherence.

23. (Twice Amended) The system of claim 1, in which said device further comprises (d) a detector circuit.

24. (Twice Amended) A method of determining one or more ion channels of a cell that are affected by a test substance, comprising:

(a) contacting a substance to be tested with a device comprising a solid state microelectrode; a cell culture including one or more cells having a cell membrane including one or more ion channels, which one or more cells are capable of providing a measurable action potential that exhibits one or more perceptible characteristics in response to a test substance; an intervening layer in contact with the microelectrode surface that provides a high impedance seal and which is positioned between said microelectrode and said cell culture,

(b) collecting data on the action potential, the one or more characteristics thereof, or one or more changes therein; and

(c) determining from said data the one or more ion channels that are affected by the test substance.